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ABSTRACT

Presented is a collection of materials developed and used with teachers in western Kentucky in workshops on the teaching of basic skills. The material is particularly concerned with methods teachers can use to provide motivation for students to learn and enjoy mathematics. Included are activities for problem solving, graphing, addition, subtraction, division, multiplication, estimation, and calculator use. Diagnosis records are appended. (TG)

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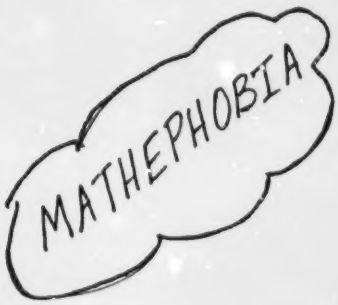
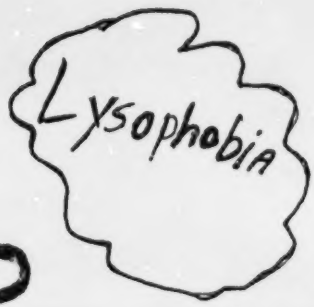
WHAT'S IT ALL ABOUT?





by

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A MANUAL FOR BASIC SKILLS WORKSHOP

MURRAY STATE UNIVERSITY
Murray, Kentucky 42071

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WHAT'S IT ALL ABOUT?

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Diane, Joe, and Willis
would like to give
special acknowledgement to

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who did all of the graphics,
typing, and in addition to this -- much more ...
her smiles. She is living proof that
being "over qualified" does not equate to being "under productive."

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IT'S ABOUT . . . .

. . . . the business of motivating teachers in their efforts to teach mathematics.

. . . . the business of motivating school children in their efforts to learn mathematics.

. . . . people interested in school children sharing what they know that "works" in the classroom.

. . . . success

. . . . success that leads to success

. . . . life made better through success in school mathematics.

. . . . people feeling good about what they do

Like

You

Me

Our students.

. . . . our very best.

Willis N. Johnson

Joseph A. Baust, Sr.

Diane Jackson Harris

"The Essentials of Education"

Public concern about basic knowledge and the basic skills in education is valid. Society should continually seek out, define, and then provide for every person those elements of education that are essential to a productive and meaningful life.

The basic elements of knowledge and skill are only a part of the essentials of education. In an era dominated by cries for going "back to the basics," for "minimal competencies," and for "survival skills," society should reject simplistic solutions and declare a commitment to the essentials of education.

A definition of the essentials of education should avoid three easy tendencies: to limit the essentials to "the three R's" in a society that is highly technological and complex; to define the essentials by what is tested at a time when tests are severely limited in what they can measure; and to reduce the essentials to a few "skills" when it is obvious that people use a combination of skills, knowledge, and feelings to come to terms with their world. By rejecting these simplistic tendencies, educators will avoid concentration on training in a few skills at the expense of preparing students for the changing world in which they must live.

Educators should resist pressures to concentrate solely upon easy-to-teach, easy-to-test bits of knowledge, and must go beyond short-term objectives of training for jobs or producing citizens who can perform routine tasks but cannot apply their knowledge or skills, cannot reason about their society, and cannot make informed judgments.

What, then, are the essentials of education?

Educators agree that the overarching goal of education is to develop informed, thinking citizens capable of participating in both domestic and world affairs. The development of such citizens depends not only upon education for citizenship, but also upon other essentials of education shared by all subjects.

The interdependence of skills and content is the central concept of the essentials of education. Skills and abilities do not grow in isolation from content. In all subjects, students develop skills in using language and other symbol systems; they develop the ability to reason; they undergo experiences that lead to emotional and social maturity. Students master these skills and abilities through observing, listening, reading, talking, and writing *about* science, mathematics, history, and the social sciences, the arts and other aspects of our intellectual, social, and cultural heritage. As they learn about their world and its heritage, they necessarily deepen their skills in language and reasoning and acquire the basis for emotional, aesthetic, and social growth. They also become aware of the world around them and develop an understanding and appreciation of the interdependence of the many facets of that world.

More specifically, the essentials of education include the ability to use language, to think, and to communicate effectively; to use mathematical knowledge and methods to solve problems; to reason logically; to use abstractions and symbols with power and ease; to apply and to understand scientific knowledge and methods; to make use of technology and to understand its limitations; to express oneself through the arts and to understand the artistic expressions of others; to understand other languages and cultures; to understand spatial relationships; to apply knowledge about health, nutrition, and physical activity; to acquire the capacity to meet unexpected challenges; to make informed value judgments; to recognize and to use one's full learning potential; and to prepare to go on learning for a lifetime.

Such a definition calls for a realization that all disciplines must join together and acknowledge their interdependence. Determining the essentials of education is a continuing process, far more demanding and significant than listing isolated skills assumed to be basic. Putting the essentials of education into practice requires instructional programs based on this new sense of interdependence.

Educators must also join with many segments of society to specify the essentials of education more fully. Among these segments are legislators, school boards, parents, students, workers' organizations, businesses, publishers, and other groups and individuals with an interest in education. All must now participate in a coordinated effort on behalf of society to confront this task. *Everyone* has a stake in the essentials of education.

**The preceding "The Essentials of Education" embodies the collective concern of the endorsing associations that follow on the next two pages. It expresses their call for a renewed commitment to a more complete and more fulfilling education for all. They invite the concurrence, support, and participation of everyone interested in education.

Organizations for "The Essentials of Education"

American Alliance for Health, Physical Education, Recreation and Dance
1201 16th Street, NW
Washington, DC 20036
(202) 833-5553

American Council on the Teaching of Foreign Languages
Two Park Avenue
Room 1814
New York, NY 10016
(212) 689-8021

Association for Supervision and Curriculum Development
225 North Washington Street
Alexandria, VA 22314
(703) 549-9110

International Reading Association
800 Barksdale Road
P.O. Box 8139
Newark, DE 19711
(302) 731-1600

Music Educators National Conference
1902 Association Drive
Reston, VA 22091
(703) 860-4000

National Art Education Association
1916 Association Drive
Reston, VA 22091
(703) 860-8000

National Association of Elementary School Principals
1801 North Moore Street
Arlington, VA 22209
(703) 528-6000

National Council for the Social Studies
3615 Wisconsin Avenue, NW
Washington, DC 20016
(202) 966-7840

National Council of Teachers of English
1111 Kenyon Road
Urbana, IL 61801
(217) 328-3870

National Council of Teachers of Mathematics
1906 Association Drive
Reston, VA 22091
(703) 620-9840

Organizations for "The Essentials of Education" continued

National Science Teachers Association
1742 Connecticut Avenue, NW
Washington, DC 20009
(202) 265-4150

Speech Communication Association
5205 Leesburg Pike
Falls Church, VA 22041
(703) 379-1888

WARM UP!

Read the following sentence:

"Finished files are the result of years of scientific study combined with the experience of many years."

How many letter "f's" are in the above sentence? _____

Count them again. How many? _____

Now ask a friend to do likewise.

Did you notice anything peculiar?

Maybe some people aren't so dumb/smart after all.

Part I

MATH JIVE

Mathematics Is a Mind Set

Whatever your definition, mathematics is a way of thinking and communicating. Yet, how one perceives the purposes of this thinking and communication effects the way it is taught. Therefore, success or failure depends on your perception of mathematics.

What is IT?

What is IT'S purpose?

Why should children know about mathematics?

How important is mathematics to me?

These are questions that must be asked by you, the teacher, before any instruction can take place.

Mathematics is to your students what you make it. Students see what you demonstrate. Thus, mathematics taught and learned in your classroom is what you make it as translated from your mind. Mathematics is a "mind-set"!!!

THE 9 U'S OF TEACHING MATH TO MOTIVATE

(For Teachers Only)

1. You HAVE TO FEEL GOOD ABOUT MATHEMATICS AND PROJECT THIS!

2. You HAVE TO SHOW ENTHUSIASM FOR AND ABOUT MATHEMATICS!

3. You HAVE TO SHOW YOU, AS A TEACHER, ARE A LEARNER!!

4. You HAVE TO GET INVOLVED, TOO!

5. You MUST LOOK POSITIVELY AT ALL THINGS IN MATHEMATICS!

6. You MUST SHOW MATH IS A REWARD AND NOT A PUNISHMENT!

7. You MUST SHOW MATH HAS RELEVANCE AND APPLICABILITY! (THIS IN ITSELF CREATES A MATH MOTIVATING MOVEMENT.)

8. You MUST CHANGE OR MAKE A CHANGE OF PACE FOR THE STUDENTS.

9. You MUST NOT ALLOW YOUR STUDENTS TO THINK MATH IS INVOLVED IN EVERYTHING, AT LEAST INITIALLY. PROVIDE THEM WITH ACTIVITIES THAT MAKE MATH NECESSARY.

WHAT CAN YOU (THE TEACHER) DO TO IMPLEMENT THE 9 U'S OF TEACHING MATH TO MOTIVATE?

1. MAKE STUDENTS ESTIMATE:

   a. How many beans in a bottle without counting.

   b. How many gallon of water in a small swimming pool.

   c. How many kilograms the entire class weighs.

   d. How close (in centimeters) the wastepaper basket is to the teacher's desk.

   e. The height (in centimeters) of each student and the arm span of each student.

   f. How tall a tree is in the schoolyard.

   g. How many points Dr. "J" will get in the basketball game if he takes 50 shots.

2. MAKE STUDENTS SEE IF THEY CAN TRY:

   a. Getting in lifeboats of varying size, i.e., a 50 cm^2 piece of tag board where the students must see if they all can place their feet on the boat!

   b. Playing games. Bring in some commercial games and get students to explore strategies for winning, i.e., use Kahla as an excellent means of introducing math/geography/history/ethnicity. (Are there ways to assure winning?) i e., what about Blackjack?

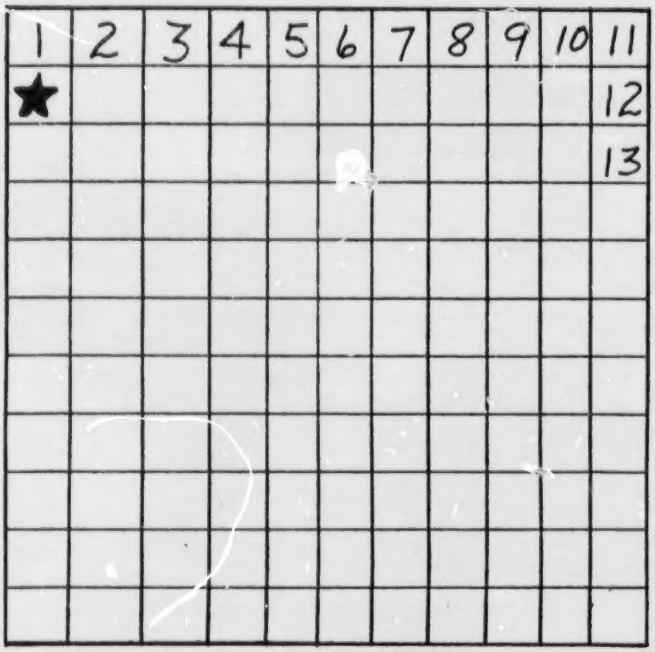
   c. Playing BUZZ/FIZZ. Are there ways of figuring out who will say what numbers? Is there an optimum group for competition. At what point does group size negatively effect the outcome?

   d. Building a bridge from marshmallows and run spaghetti to span 15 cm and is capable of holding one regular brick.

3. MAKE STUDENTS PREDICT:

   a. On a 11 x 11 matrix numbered from 1 to 14 along the outside blocks, beginning with the far left-hand corner, what number would fall in the starred block. (Don't count; see if you can figure a way without counting!)

3 a continued



Other prediction questions would be where would number 55 fall; what number would be last; where would this number fall in the matrix.

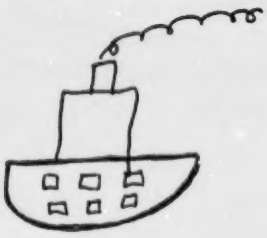
4. MAKE STUDENTS LOOK FOR PATTERNS:

   a. Survey the high traffic areas of the school to find out what times are the most congested, why this occurs. Have the students suggest other problems they have observed as the result of the original study.

5. MAKE STUDENTS FORGET TRADITIONAL MATH AND PROVIDE FUN ACTIVITIES THAT USE MATH:

   a. Use the Koenigsburg Bridge problem.

   b. Use ideas from "The I Hate Mathematics Book" by Marilyn Burns for assistance.



EMBARKING WITH THE CALCULATOR

The calculator can be used to enhance, be supplemental, or on any other level inbetween in the mathematics classroom.

The most important thing is for you, the teacher, to come to grips with what is the most comfortable form to use the calculator in your classroom.

It should be used to show students how calculators can be helpful as a problem-solving tool in "real-life." This means providing activities for students that require consumer applications or integrated subject matter.

SUGGESTED ACTIVITIES

1. What Word Ya Say Ya Got?

   Assign each letter of the alphabet a numeral. At first have each letter with a sequentially ordered number, i.e., A=1, B=2, C=3, ...

   Assign groups of students a target number, i.e., 70. Their job will be to construct at least one word whose sum makes 70.

   Vary this activity by changing the number amount assigned to each letter or by accepting a word with no less than five letters for a sum.

2. Consumer Math

   Collect several mail-order catalogs (preferably the ones with a large variety of things for sale). Divide the class into groups where four persons would be in a group. Pose one of the following problems:

   a. You have been given $1,000 to spend. Your group is to try to get the closest to $1,000 as possible without going over that amount.

   b. Students must figure 5% sales tax in their calculations.

   c. Students must find the minimum amount of items and still come the closest to $1,000. (You may not order the same item twice.)

   d. Students must find exactly eight items and come the closest to $1,000. (You may not order the same item twice.)

   e. Students must figure shipping charges for the items. All tabulations must be done on the calculator with a written detail of items purchased.

   f. Give a larger amount of money to each group.

BIBLIOGRAPHY FOR THE CALCULATOR

Bitter, Gary. "The Calculator and the Curriculum," Teacher, February 1977, pp. 64-67. (Ideas for teaching/purchasing calculators for classroom use.)

Bitter, Gary. ACTIVITIES HANDBOOK FOR TEACHING WITH THE HAND-HELD CALCULATOR. Allyn and Bacon, Inc., (Boston, Mass.) 1980. (An extensive bibliography of sources of philosophical as well as experiential is provided.)

PART II

SO WHAT'S BUGGING YOU?

Listed on the following pages are some problems encountered by some teachers. Some suggested answers are in this booklet. However, an even better approach is a discussion with professional colleagues.

"It is difficult for students to see that math is relevant to their everyday living."

"Borrowing in subtraction is the biggest problem I had this year."

"Trying to find the time and a workable method of reaching those children identified by the CTBS as needing improvement in math. Classes are 45 minutes with approximately 35 students per class."

"I have a problem with some students who do not learn the multiplication tables. Because of this, they cannot progress through the multiplication and division units. Also, subtraction skills using zeroes or regrouping sometimes keep our students from learning division skills easily."

"Problem solving--my students have a difficult time deciding which numbers to do what with. In other words, deciding which operation to apply and which numbers to use is hard for them."

"First, the kids seem to be indifferent about learning math. They either feel they already know how to add, subtract, multiply, and divide and don't need to learn anything else. On the other hand, I also encounter students who feel like they don't know how to do one of these skills and have given up on themselves ever learning it."

"It seems like it's easy to get into a rut of doing the same dull routine day after day. I could use some more ideas on how to diversify my teaching and motivate those that aren't easily motivated."

"The students in my class were a 'unique-one of a kind' group--They all did not care whether they passed school, let alone math. Their only interest was to see who could care the least! They didn't see that math was a very important necessity to their survival in the domestic as well as business world. They did not care about any of the areas of math I tried to teach!

"The textbook and a school board approved competency program do not always coincide. The materials provided in the text are often treated in a different manner than the required competency tests."

"Vocabulary--The student sat in the seat in a low level math class. I could tell he was obviously upset at the problem and asked him if I could be of any assistance. The problem was--name the four seasons--being a rural school and a typical sixth-grade boy, he looked up at me and said--Mrs. Crawford, I can only think of deer season, duck season, and rabbit season. I can't come up with that fourth season."

"On the eighth-grade level there seems to be a constant problem in the area of graphs. I have experienced some of these problems in the science classroom. They seem to be lost in the use and understanding of graphing."

"Students have problems with the application of math skills. When working with students in any skill, they seem to understand the concepts and procedures. However, when given a written situation or story problem, they are unable to analyze the problem and determine a method of working it out."

"Many students do react very negatively when we come to fractions. They automatically put up roadblocks. By the time they reach the seventh grade the damage is very extensive. What and how can one deal effectively with this situation?"

"How can a teacher teach individualized instruction when the supervisor likes large-group instruction and strongly suggests it, while emphasizing individualized instruction?"

"Keeping all students on an individualized program without losing some in the process and grading them on an individual level."

"We have a structured levels program at our high school. A student I had this last year was placed in a special education class and after the first six weeks of school his parents refused to sign permission for him to remain in special ed although he qualified for it. Then he was placed in an average level Algebra I class--six weeks behind. I felt very bad about trying to help him succeed when he couldn't."

"Students insist on wanting to know 'how they did' in terms of percentage, but can't visualize the procedure for discovering this information. For example, give a score of 7.5 on a 10-point quiz, many cannot see that the equivalent is 75%. Few of freshman students could, for example, divide 35 into 24 to determine a percentage figure. 'You can't divide 35 into 24,' they protest."

WHOLISTIC - SCHMOLISTIC: GETTING THE BUGS OUT

STEP I

In Appendix B of this booklet are objectives listed under what is entitled "Teaching Diagnosis." Workshop participants are to record their responses in the appropriate places. (Levels A, B, C, and D correspond to the CTBS Test Levels 1, 2, 3, and 4, respectively.)

STEP II

An analysis of the results will probably indicate (in most cases) that some objectives are considered to be more difficult to teach than others. Some objectives are believed to be more important than others. And, yes, time spent on the objectives will vary greatly.

How do the objectives correspond with your text program?

How do the objectives "fit in" timewise in your teaching?

Is it really possible to give your students adequate exposure to all of the objectives?

STEP III

At this point it will probably be quite clear why either you follow the text closely or teach in an individualized setting--the pressure is taken off of you.

But what is your real plan of attack? Do you organize your year as you go along or otherwise?

Do you teach nothing but addition, subtraction, multiplication, and division with lots of problems most of the year?

Do you get bored and frustrated?

Do your students get bored and frustrated?

Perhaps! Just perhapenstance, you are one of those teachers in upper elementary on through the high school grades. Perhaps your thinking is too basic. If you think you can be of any big help with that basic fact and basic skill stuff, you had better be prepared to put in a lot of time with that/those student(s).

Recommendation:

1. Diagnose the skill needs of the student.
2. Prescribe a tutorial program.
3. Follow up the tutorial program.
4. Outline a plan for progress.

Consider!

The best way to teach the "basic skills" is not to spend all of your time teaching the "basic skills" but, rather, to spend your time *using* the "basic skills."

For some keen insights into this, you should remember the activities and guidelines in this workshop and look forward to the Development of Problem-Solving Skills.

REMEMBER! If you don't use it, you lose it. Plan accordingly.

PART III

THE DEVELOPMENT OF PROBLEM-SOLVING SKILLS

THE DEVELOPMENT OF PROBLEM-SOLVING SKILLS

1. The ability to look for several possible solutions to a problem. Respond with a variety of ideas and alternatives. Think of unusual ideas and always add to your ideas.

2. The ability to forecast or predict the outcome of a problem or situation. Make many and varied predictions about a situation.

3. The ability to think of many and varied things that are like another thing in a special way.

4. The ability to think of many and varied solutions to the problem. Think more carefully about each alternative. Select one alternative that you consider the best. Give many and varied reasons for your choice.

ACTIVITIES FOR DEVELOPING PROBLEM-SOLVING SKILLS

1. (a) A man was running home. Near home he met a masked man. He stopped. Then he turned around and ran back to where he started. Why?

   (b) How many doors could a person go through in a day? Name as many unusual and different doors as you can think of. How many of these doors could be found in your home? How many would be found in places other than a home or school?

   (c) How can you eat a fried egg (the white is set but the yolk is nice and loose) so that the yolk doesn't run all over the plate, but ends up inside of you?

   (d) How many ways can you turn a glass of water upside down without spilling the water?

2. (a) Show the pupils a popcorn popper in the middle of a circular sheet of paper, which has been marked off into pie sections. Have the pupils sit around the edges. Turn the popper on but leave the lid off and pop a few kernels while they observe the activity. Next, have the pupils predict how many kernels of corn will land in their section--popped/unpopped. How far will the popcorn pop? What will be the nearest kernel? The pupils will follow up their estimations or predictions by actually measuring, counting, and adding.

   (b) How many names are in the white pages of a telephone directory?

   (c) How many telephone numbers can there be that start with the same first three numbers as yours?

3. (a) Have the pupils generate a list of similarities between addition and subtraction; between addition and multiplication; between subtraction and division. Compare the ways in which these mathematical processes are similar, and discuss the findings.

   (b) Use magic square activities to reinforce the concept that one approach to solving a problem might be to find out how that problem is like a problem that you have already solved.

   (c) Use pattern sequences that call for the pupil to find the missing number or item.

   (d) Use programmed materials that call for pupils to make analogies.

(e) The words in the groups below don't seem to have much to do with each other. Try to think of a link---something they have in common. Try to link them in more than one way.

Pencil	Apple	Football
Flower	Lamp	Lemon
Basket	Stapler	Clay
Tree	Telephone	Clock

4. (a) Remember the old woman who lived in a shoe with all those children? (See Mother Goose.) When she didn't know what to do, she gave them broth without bread, whipped them, and sent them to bed. Who had a problem--the old woman or the children? Who has the biggest problem? What is it?

(b) Ask questions that call for the pupils to think of logical reasons why and give reasons for their choices.

(1) Why do girls' shirts button one way and boys' shirts in the opposite way?

(2) Why do most chairs have four legs?

(3) Why are most rooms either square or rectangular?

SOME SUGGESTED RESOURCE MATERIALS

GAMES

1. Department Store Math

   Gives pupils practice in problem-solving real life situations. My students love it!

   Company: LaPine Scientific Company

2. Genius

   An addition game for pupils in grades one through four. This game provides good review and practice in addition.

   Company: LaPine Scientific Company

3. Monster Multiplication

   A fun way for pupils to learn and review the multiplication facts. My students are crazy about it. (Grades three through eight)

   Company: SVE

4. Interceptor

   The stress is on long addition, multiplication, subtraction, and division. This is a game that is informative and interesting at all grade levels.

   Company: LaPine Scientific Company

KITS

1. The Game Builder Kit I/Grades 2 - 4 — Dale Seymour
   The Game Builder Kit II/Grades 5 - 8

   These kits provide a creative and fun way to take the boredom out of arithmetic skill review.

BOOKS

1. Good Time Math Event Book by Marilyn Burns

   This book is great!! There are also math event cards that correspond to the activities in the book; these are available separately.

2. Creating and Using Learning Games by Craig Pearson and Joseph Marfuggi

   This is a very informative and useful book; every teacher in grades two through eight needs a copy.

PART IV

WHO CARES ABOUT DICK AND JANE, THEIR SEVEN APPLES THAT COULDN'T BE PUT IN FOUR BOXES WITH ONE IN EACH BOX AND NONE LEFT OVER, AND .....?

WHO CARES ABOUT DICK AND JANE, THEIR SEVEN APPLES THAT COULDN'T BE PUT IN FOUR BOXES WITH ONE IN EACH BOX AND NONE LEFT OVER, AND .....?

Let's take a moment to think about thinking. What some of us call "teaching thinking" is simply a matter of "tricks" that work some or most of the time. As an example: "If you see the word 'altogether' that means add or multiply." "If you see the word 'each,' 'divide,' ... etc. Is this really teaching thinking? And besides, if most of your time is spent on algorithmic processes, how can we be held accountable for non-algorithmic processes that must be applied in new and unique situations. Again, this workshop is reiterating the notion that the best way to maintain and develop algorithmic processes is by using them in some meaningful context.

The matrix that is presented (next page) is for discussion purposes only. You will notice that there are suggestions to facilitate any problem-solving strategy. Also, seven categories, or types, of problems have been included. Problems are usually time, space, or event related. With so many variables inherent in problem-solving skills, what is needed, then, is not a development of an algorithmic process for solving problems. Rather, attack skills, that may indeed be unique to each individual, need to be developed. Our role, then, as teacher is to provide interesting problems, encourage a search for solutions, and interact with the process whenever possible.

PROBLEM-SOLVING MATRIX -- A SEARCH FOR HEURISTICS

Practical Strategy* \ Type of Problem	Combinatorics (choosing an operation)	Generalizing (too much information)	Data Gathering (too little information)	Numerical Analysis	Verbal Logic	Pictorial Logic	Mechanical or Movement Logic
1. Approach each problem with a playful, flexible, and exploratory attitude.							
2. Draw thinking diagrams--sketches or "models"--to help you organize your thought.							
3. Think out loud.							
4. Put your thoughts into words.							
5. Use names, labels, and verbal relationships to clarify and add structure to your thought processes.							

*Albrecht, Karl. "The Thinkers Test," READER'S DIGEST, (April 1980), p. 43.

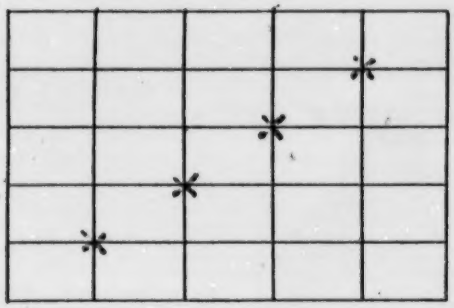
PART V

SOME MORE GOODIES FOR YOU ...

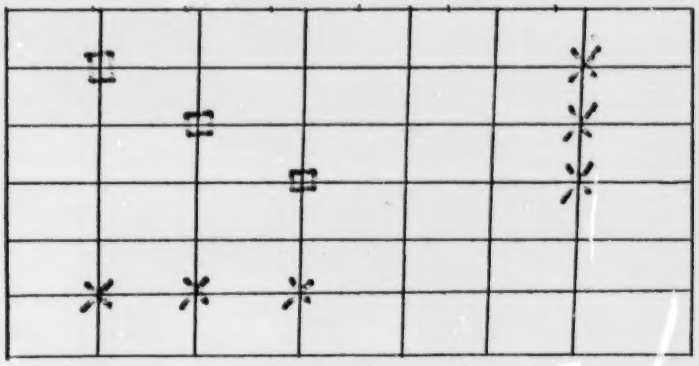
A. ADVENTURE INTO SQUARESVILLE

Introductory Activities

1. Tic-Tac-Toe ----- _____ in a Row



2. Battleship: Locate three battleships adjacent to one another in a straight line. Your mission is to figure out how to destroy them. (If there is more than one of you tracking, take turns.) The ships are located something like this:



3. Guess My Rule: Here you ask learners to give you a number and you give them the resulting number according to your predetermined rule. You then ask if anyone has guessed your rule. Play continues until rule has been determined. Coordinate charting should be done as you go along.

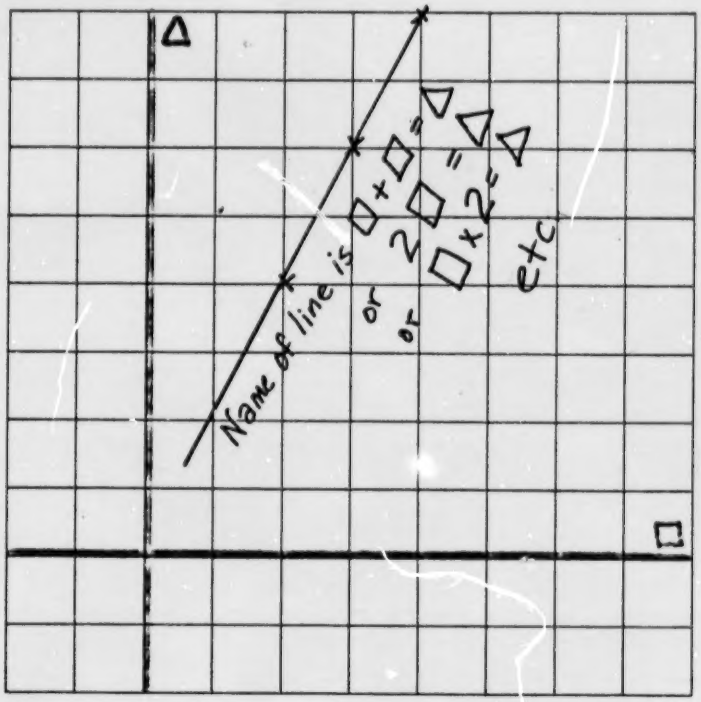
The rule is □ + 2 = △.

□	△
3	5
2	4
.	.
.	.
.	.

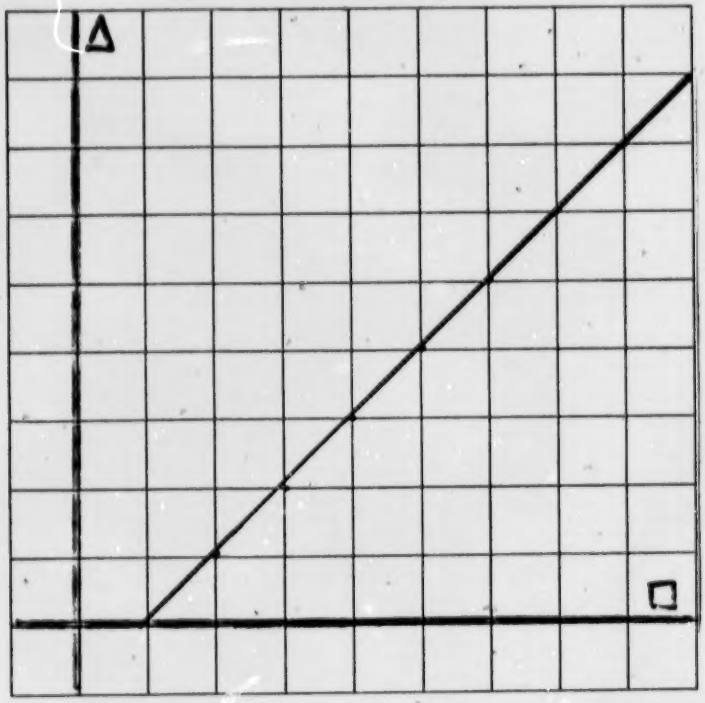
NOTE: Rules get to be very complex.

4. Extend "Guess My Rule" to graphing coordinates.

□	△
2	4
3	6
4	8
5	10
6	.
.	.
.	.



5. Extend the graphing in the preceding example to "Guess My Rule" when given the graph.



The rule here is

□ - 2 = Δ.

Additionally, Squaresville will make it simple for learners to record data from simple experiments. The use of a pictorial model as squaresville will assist in appreciating the beauty of mathematics--maybe even for you.

B. Help from HELP

HELP is an excellent resource out of Valdosta, Georgia. In helping you to respond to career needs and math skills development, HELP is an excellent beginning. HELP has developed activities for over 140 careers. A sampling has been enclosed to excite you about its possibilities. These activities are not free, but there is little doubt that it will be money well spent.

As you examine the activities, you find more than titles and problems. You will find information on how to qualify for each career, what do people really do on the job, and additional help for you the teacher.

An order form has been included for your convenience. Send to:

HELP
PO Box 2695
Valdosta, GA 31601

C. NEWSPAPER AND MATHEMATICS

Yes, that daily tabloid is a math textbook--especially, the Sunday editions. What you and your learners can do with newspapers are limited only by your imagination.

Consider these skills that can be developed with newspapers:

1. Percentages and Decimals
2. Graphing
3. Area Measurement
4. Word (Statement) Problems
5. Ratio
6. Temperature Measurement
7. Statistical Mean, Median, Mode
8. Fractions
9. Multiplication
10. Subtraction
11. Addition
12. Division
13. Place Value
14. Estimation Skills
15. Money Concepts
16. Extrapolation/Interpolation
17. Calculator Skills
18. Computer Skills

Example 1:

Objective: Addition and subtraction of decimals.
Activity: Making shopping lists within a budget.

Example 2:

Objective: Percentage.
Activity: Computing discounts and savings.

Example 3:

Objective: Extrapolation/Interpolation.
Activity: Given weather maps, determine temperature for selected towns, etc.

Example 4:

Objective: Graphing.
Activity: a. Chart temperature patterns over a period of time.
b. Chart want ad groupings over a period of time.

Example 5: etc.

D. MATHEMATICS RESOURCE PROJECT MATERIALS
(can be obtained from Creative Publications)

--Number Sense and Arithmetic Skills
a massive resource of activities

--Statistics and Information Organization
If you are interested in high-powered stuff without the "book" approach, this is for you.

BIBLIOGRAPHY OF SOURCES FOR FUN/GAMES TO MOTIVATE CHILDREN WITH MATH

Burns, Marilyn. THE I HATE MATHEMATICS BOOK. Little, Brown and Company, (Boston, Mass.) 1975.

_____. THE BOOK OF THINK. Little, Brown and Company, (Boston, Mass.) 1976.

_____. THE GOOD TIME MATH EVENT BOOK. Creative Publications, Inc., (Palo Alto, Cal.) 1977.

Kennedy, Leonard. EXPERIENCES FOR TEACHING CHILDREN MATHEMATICS. Wadsworth Publishing Company, Inc., (Belmont, Cal.) 1973.

Krulik, Stephen. A HANDBOOK OF AIDS FOR TEACHING JUNIOR/SENIOR HIGH SCHOOL MATHEMATICS. W. B. Saunders Company, (Philadelphia, Pa.) 1971.

Kuenzi, N. J. and Bob Prielipp. CRYPTARITHMS AND ARITHMETICAL PASTIMES. School Science and Mathematics Association, (Indiana, Pa.) 1979.

Olson, Alton T. MATHEMATICS THROUGH PAPER FOLDING. National Council of Teachers of Mathematics, (Reston, Va.) 1975.

Schminke, C. W. and Enoch Dumas. MATH ACTIVITIES FOR CHILD INVOLVEMENT (2nd edition). Allyn and Bacon, Inc., (Boston, Mass.) 1977.

Walter, Marion I. BOXES, SQUARES, AND OTHER THINGS. National Council of Teachers of Mathematics, (Reston, Va.) 1970.

APPENDIX A
(Schedule)

TENTATIVE SCHEDULE FOR WORKSHOPS
in
TEACHING BASIC MATH SKILLS - 4, 11, 18 June 1980

Presentors: Willis N. Johnson
Joseph A. Baust
Diane J. Harris

June 4

-- Icebreaker / Diane

-- "What's It All About" / Willis

-- Math Jive / Joe

-- BREAK - 10 minutes

-- So What's Bugging You? / Willis

-- Shake the Frizzies Off / Diane

-- LUNCH (1 hour)

-- Goodies/Part I / Joe, Diane, Willis

June 11

-- More Math Jive / Joe

-- Wholistic-Schmolistic: Getting the Bugs Out / Willis, Joe, Diane

-- (Time permitting: "Have I Got a Kid for You!")

-- LUNCH (1 hour)

-- Goodies/Part II / Diane, Joe, Willis

June 18

-- No Jive

-- Who cares about Dick and Jane, their seven apples that couldn't be put in four boxes with one in each box and none left over, and ... ?
Diane, Joe, and Willis will demonstrate how you, too, can be a "bad" teacher with problems.

-- (Boy! Have I Got a Kid for You!)

-- LUNCH (1 hour)

-- Goodies/Part III / Willis, Joe, Diane

(Demathematizing kits will be available at this time.)

APPENDIX B
(Diagnosis of Teaching the Basic Skills of School Mathematics)

TEACHING DIAGNOSIS - LEVEL A

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS COMPUTATION

Objectives:

	IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY
1. Add two or more single-digit addends. (given vertically)			
2. Add two-digit addends without carrying (regrouping). (given horizontally or vertically)			
3. Add two-digit addends with carrying (regrouping) (given horizontally and vertically)			
4. Add or subtract with money using the $ and decimal point notation.			
5. Add or subtract multidigit numbers. (use of compass)			
6. Add four or more multidigit algorithms.			
7. Multiply one-digit numbers. (given vertically and horizontally)			
8. Multiply two- or more-digit numbers by one-digit numbers.			
9. Divide one- to three-digit dividends with one- to two-digit divisors and quotients with no remainder.			

TEACHING DIAGNOSIS - LEVEL A

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS CONCEPTS AND APPLICATIONS

Objectives:

	IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY
1. Tell what the value of each digit in a multi-digit numeral is.			
2. Identify simple plane figures.			
3. Read numerals in alphabetic form and vice-versa.			
4. Use terms with geometric figures like "center", "on", etc.			
5. Relate geometric shapes to items found in the environment.			
6. Compare sets using terms like "equal", "more than", etc.			
7. Use simple fraction words (half, fourth, etc.) with sets of objects.			
8. Use the terms "empty set", "half dozen", etc.			
9. Read clocks with "hands."			
10. Relate metric units of measure to what they measure.			
11. Relate customary units of measure to what they measure.			
12. Convert units of money, (pennies to nickels, etc.).			
13. Use ordinal number terms.			
14. Show ways of "naming" numbers using operations. (7= 3+4 = 9-2 = 14÷2 etc.)			
15. Number sentences with one unknown.			
16. Read ordinal numerals in alphabetic form and vice-versa.			
17. Read number lines.			
18. Order numerals to 100,000.			

TEACHING DIAGNOSIS - LEVEL A

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS CONCEPTS AND APPLICATIONS continued

Objectives:

	IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY
19. Number sentences that illustrate properties without using the names of properties.			
20. Use "even" and "odd."			
21. Pair numbers using parentheses. (a, b)			
22. Solve statement problems with money and whole numbers. Use ¢ notation.			
23. Solve statement problems that require two steps.			
24. Determine operations needed to solve statement problems.			
25. Match solution pictures (diagrams) to statement problems.			
26. Compare sets.			
27. Make plane geometric figures using other plane geometric figures.			
28. Represent money amounts using $ and decimal numbers.			
29. Solve statement problems using the calendar.			
30. Solve statement problems using customary units of measure.			
31. Measure using rulers.			
32. Complete a simple numerical pattern (sequence).			
33. Given values for variables, evaluate an equation.			
34. Solve statement problems using the four operations and numbers less than 100.			
35. Solve statement problems using transitivity.			

TEACHING DIAGNOSIS - LEVEL B

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS COMPUTATION

Objectives:

1. Add and subtract multidigit numbers with carrying (regrouping). (given horizontally and vertically)
2. Add whole numbers to mixed numbers. (given horizontally and vertically)
3. Add four or multidigit numbers. (given horizontally and vertically)
4. Add and subtract simple fractions with common denominators.
5. Add and subtract fractions with unlike denominators.
6. Add and subtract money using the $ notation and decimal fractions.
7. Add and subtract multidigit decimal fractions. (given horizontally and vertically)
8. Multiply and divide multidigit numbers by one-digit numbers.
9. Multiply and divide multidigit numbers by multidigit numbers.
10. Multiply simple fractions.
11. Multiply and divide a whole by a fraction.
12. Use remainder notation.
13. Multiply and divide money using "$" notation and decimal fractions.

IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY

TEACHING DIAGNOSIS - LEVEL B

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS CONCEPTS AND APPLICATIONS

Objectives:

		IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY
1.	Use brace { } notation for sets.			
2.	"Join" to sets by union.			
3.	Use fraction notation to identify fractional parts of sets.			
4.	Read "pie graphs" requiring the ordering of fractions.			
5.	Read line and bar graphs.			
6.	Use parentheses in pairing numbers and graphing.			
7.	Order fractions.			
8.	Match alphabetic forms for numbers to numeric forms and vice-versa.			
9.	Give value of digits in a multidigit number.			
10.	Classify triangles.			
11.	Convert from unit to unit using the customary measurement units.			
12.	Relate customary units of measure to what they measure.			
13.	Classify curves as simple, open, closed, etc.			
14.	Use geometric terms like: "line segment", "radius", "diameter", "hypotenuse", "circumference", "perimeter", "length", etc.			
15.	Use alphabets to name points and curves.			
16.	Name and classify plane geometric figures.			
17.	Use fraction notation to identify parts of regions.			
18.	Solve statement problems involving averages.			
19.	Match solution procedures to statement problems.			

TEACHING DIAGNOSIS - LEVEL B

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS CONCEPTS AND APPLICATIONS continued

Objectives:

	IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY
2 Use number sentences involving inequality signs.			
21 Solve statement problems that require two or more steps.			
22. Solve problems with the "¢" notation for money.			
23. Solve linear equations.			
24. Find solution sets to make number sentences true.			
25. Complete a simple arithmetical sequence (number pattern).			
26. Solve statement problems using common fractions.			
27. Convert units of money (pennies to nickels, etc.).			
28. Use scalar ("legends") units of measure.			
29. Solve statement problems involving tax.			
30. Solve statement problems using the calendar.			
31. Measure using rulers.			
32. Solve statement problems that involve time.			
33. Reason using transitivity.			
34. Solve statement problems using percent.			

TEACHING DIAGNOSIS - LEVEL C

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS COMPUTATION

Objectives:

1. Add or subtract multidigit numbers with regrouping.
2. Add or subtract mixed numbers with unlike denominators.
3. Add or subtract a common fraction and a decimal fraction.
4. Add or subtract decimal fractions.
5. Add or subtract whole numbers with exponents.
6. Multiply a multidigit number by a multidigit number.
7. Divide a multidigit number by a multidigit number using the remainder notation and the decimal fraction notation.
8. Multiply using decimal fractions.
9. Divide using decimal fractions.
10. Multiply or divide common fractions.
11. Evaluate expressions of the form

$$\left(\frac{a}{b} \times c\right) \div \left(\frac{d}{e} \times f\right)$$

	IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY

TEACHING DIAGNOSIS - LEVEL C

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS CONCEPTS AND APPLICATIONS

Objectives:

	IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY
1. Use brace notation for sets.			
2. Convert from unit to unit using the customary measurement units.			
3. Read measuring instruments using metric units (meters, etc.)			
4. Match formulas to "correct" figures.			
5. Convert decimal fractions to percent and vice-versa.			
6. Write common fractions as decimal fractions and vice-versa.			
7. Solve statement problems using ratio.			
8. Match alphabetic forms for number to numeric forms for number.			
9. Give value of digits in a multidigit number.			
10. Use exponents.			
11. Reason using positive and negative integers on a number line.			
12. Use a coordinate graph system.			
13. Reason using the arithmetical properties over the rational numbers.			
14. Reason using "reciprocal."			
15. Solve linear equations using rational numbers.			
16. Use geometric terms like: "line segment", "radius", "diameter", "hypotenuse", "circumference", "perimeter", "angle", etc.			
17. Use the alphabet to name points and curves.			
18. Solve statement problems using "average."			

TEACHING DIAGNOSIS - LEVEL C

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS CONCEPTS AND APPLICATIONS continued

Objectives:

	IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY
19. Reason using transitivity.			
20. Order fractions.			
21. Evaluate algebraic expressions.			
22. Solve statement problems involving morey.			
23. Solve statement problems involving percent.			
24. Solve statement problems involving "volume."			
25. Solve statement problems involving "tax."			
26. Solve statement problems involving "area."			
27 Estimate metric measurements using customary units.			
28. Solve statement problems using customary measurment units.			
29. Complete arithmetical sequences (number patterns) over the rational numbers.			
30. Solve statement problems requiring two or more steps to the solution.			
31. Use scalar ("legends") units of measure.			

TEACHING DIAGNOSIS - LEVEL D

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS COMPUTATION

Objectives:

	IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY
1. Add or subtract simple fractions with unlike denominators and "reduce to lowest terms." (given horizontally)			
2. Add or subtract mixed numbers with unlike denominators and "reduce to lowest terms." (given vertically)			
3. Add or subtract a common fraction and a decimal fraction and express sum or difference in decimal and common fraction form.			
4. Add mixed numbers with unlike denominators and more than two addends.			
5. Add or subtract mixed numbers with denominators of powers of ten.			
6. Add or subtract two or more addends with one variable or unknown.			
7. Add or subtract whole numbers expressed with exponents (no literals or variables).			
8. Add or subtract decimal fractions (given horizontally).			
9. Add or subtract decimal fractions expressed with exponents (no literals or variables).			
10. Add or subtract integers.			
11. Subtract a number in the form ($\frac{a}{b}$ x whole number) from a number in the form ($\frac{c}{d}$ x whole number).			
12. Subtract a mixed number from a whole number.			
13. Subtract a decimal fraction from a decimal fraction (with borrowing or regrouping).			
14. Subtract when numbers are expressed in the form $\frac{x}{a} - \frac{x}{b}$ where "a" and "b" are integers.			

TEACHING DIAGNOSIS - LEVEL D

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS COMPUTATION continued

Objectives:

	IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY
15. Multiply and divide multiple digit whole numbers.			
16. Multiply and divide simple fractions.			
17. Multiply a decimal fraction by a common fraction and express product as in decimal and common fraction form.			
18. Multiply and divide whole numbers by mixed numbers.			
19. Multiply and divide decimal numbers by whole numbers.			
20. Multiply and divide decimal fractions by decimal fractions.			
21. Multiply two literal terms with same variable.			
22. Multiply and divide same variable with exponent.			
23. Multiply and divide signed rational numbers.			

TEACHING DIAGNOSIS - LEVEL D

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS CONCEPTS AND APPLICATIONS

Objectives:

	IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY
1. Order common fractions. ("Greatest value")			
2. Order decimal fractions. ("between", "number line")			
3. Express decimal fraction as percent.			
4. Order numbers expressed as percents.			
5. Find $\sqrt{\text{whole number}}$.			
6. Use term "more than" and "less than" with integers.			
7. Find "integral factor" of a "prime number."			
8. "Factor" simple polynomials.			
9. Commutativity preserves equality when using literals (variables).			
10. Use tables with linear equations.			
11. "Averages."			
12. Identify procedure to determine velocity ("how fast").			
13. Identify procedure to find "percent."			
14. Translate equations to words and words to equation.			
15. Determine if enough information is given in a statement problem.			
16. Use "intersect", "union", with numerical and non numerical information.			
17. Look at simple geometric figures and be able to match given formulas for "area" or "perimeter."			
18. Discriminate between plane geometric figures and name them.			

TEACHING DIAGNOSIS - LEVEL D

IMPORTANCE -- Code 0/Not Important
1/Some Importance
2/Very Important

Estimated TIME SPENT -- Code Number of Weeks

TEACHING DIFFICULTY -- 0/Not Difficult to Teach
1/Average Difficulty
2/Rather Difficult to Teach

MATHEMATICS CONCEPTS AND APPLICATIONS continued

Objectives:

	IMPORTANCE	Estimated TIME SPENT	TEACHING DIFFICULTY
19. Use terms like: "line segment", "point", "arc", "chord", "radius", "diameter", circumference", etc.			
20. Read measuring instruments using customary units (inch, pound, etc.).			
21. Read measuring instruments using metric units (meters, etc.).			
22. Reason with transitivity using inequality signs.			
23. Solve linear equations (simple and complex).			
24. Solve simultaneous equations.			
25. Given a formula and picture with needed data, determine the related measurement. (circumference, etc.)			
26. Given values for variables, evaluate an algebraic expression.			
27. Solve statement problems that require no more math skill than the four basic algorithms.			
28. Convert units of measure within the customary system. (inches to feet, etc.)			
29. Solve statement problems that use "percent."			
30. Use "ratio."			
31. Solve statement problems with one unknown (linear).			
32. Solve statement problems using common fractions.			
33. Solve statement problems that require two steps.			
34. Solve "simple interest" problems.			

APPENDIX C
(Order form for HELP lessons)

ORDER FORM

Place an x by the units you wish to order. There is a 20% discount for orders of 10 or more units. Price per unit is 60 cents (48 cents per unit for orders of 10 or more).

__Airplane Pilot
__Art
__Auto Mechanic
__Badminton
__Bait & Tackle Shop
__Baking
__Banking
__Bank Teller
__Barber
__Bartender
__Baseball
__Basketball
__Beautician
__Bookkeeping
__Bowling
__Brick Mason
__Budgets
__Business Machines
__Butcher
__Buying & Selling
__Camping & Hiking
__Carpenter
__Cars
__Car Restoration
__Car Salesman
__Caterer
__Chain Store Manager
__Charge Account
__Chauffeur
__Clerk
__Clothing Store
__Coin Collections
__Collections (Banking,Finance)
__Commissions
__Computers
__Construction
__Contractor
__Cooking
__Cost of Education
__Crafts
__Craft Shop
__Credit Manager
__Delivery Man
__Designing
__Dietitian
__Direct Taxes
__Discount
__Door-to-door Salesman
__Editor
__Electrician
__Fabric Shop
__Farming: Crop
__Farming: Dairy
__Farm Equipment
__Farming: Livestock
__File Clerk
__Fireperson
__Fisherman
__Florist
__Flower Gardening
__Football
__Forestry
__Foundary Worker
__Furniture & Appliance Store
__Games of Chance
__Golf
__Hardware Store Manager
__Home Decorating
__Ice Hockey
__Industrial Traffic Manager
__Inspector-Food Service
__Insurance
__Insurance Salesman
__Interest
__Interior Decorator
__Jeweler
__Laundry & Dry Cleaning
__Lawn Care
__Lay-Out Man (Draftsman)
__Loans
__Loan Officer
__L.P.N.
__Mailing & Shipping
__Media Advertising
__Medical Assistant
__Medical Technician
__Motel Manager
__Mortician
__Music
__Occupational Statistics
__Office Manager
__Paint & Body Shop
__Painter
__Paramedic
__Pensions
__Personnel Manager
__Pet Shop Dealer
__Photography
__Plant Care
__Plumber
__Policeperson
__Printer
__Profit & Loss
__Quality Control
__Racing
__Radio & TV Repair
__Real Estate Salesman
__Receptionist
__Rental Business
__Restaurant Manager
__Retirement
__Sales & Property Tax
__Service Station Owner/Attendan
__Sewing
__Sheet Metal
__Shipping & Receiving Clerk
__Shopping
__Signs
__Small Grocery
__Soccer
__Social Security
__Specialty Advertising
__Stocks
__Stock Boy
__Surveying
__Swimming & Diving
__Tennis
__Tool & Die Maker
__Track
__Train Engineer
__Traveling
__Trucking
__Typist
__Utility Bills
__Vegetable Gardens
__Wages
__Waiters & Waitresses
__Welding
__Welfare
__Wholesaler

Mail Check or Money Order to: HELP
P.O. Box 2695
Valdosta, GA 31601

Name_____

Address_____

City_____

State_____ Zip_____